EXHIBIT 3

ISSUE CLASSIFICATION	
Class	Subclass

PATENT NUMBER

U.S. UTILITY Patent Application

O.I.P.E.	PATENT DATE
SCANNED KC 2 QA TM	

APPLICATION NO.	CONT/PRIOR	CLASS	SUBCLASS	ART UNIT	EXAMINER
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APPLICANTS

TITLE

PTO-2040
12/99

ISSUING CLASSIFICATION

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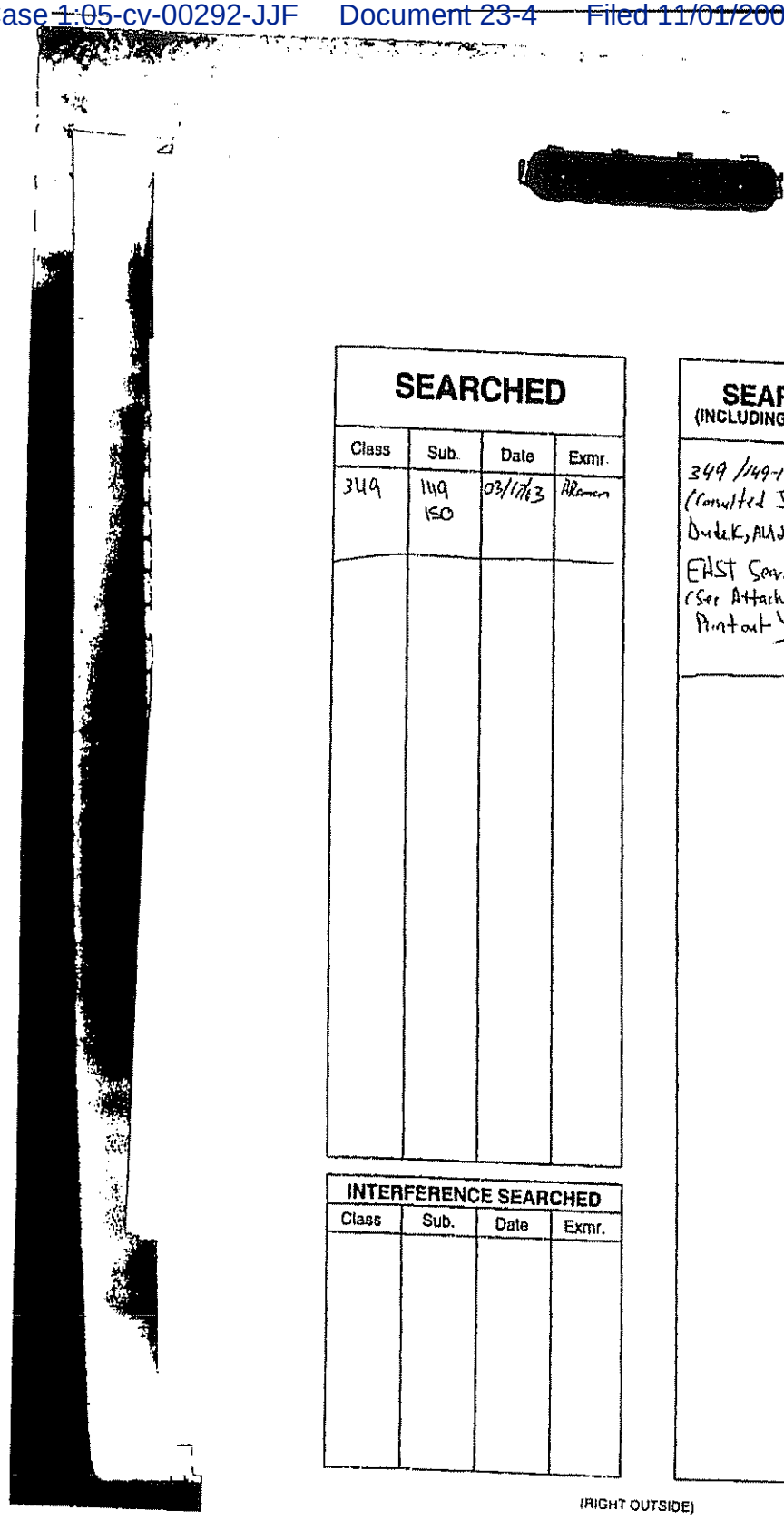

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INTERFERENCE SEARCHED

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SEARCH NOTES
(INCLUDING SEARCH STRATEGY)

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349/149-152 (Consulted Sawyer Dudek, AU 3671) EAST Search (See Attached Printout)	03/17/03	ARamon

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INDEX OF CLAIMS

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US006738121B2

(12) **United States Patent**
Yun et al.

(10) **Patent No.: US 6,738,121 B2**
(45) **Date of Patent: May 18, 2004**

(54) **TAPE CARRIER PACKAGE WITH DUMMY BENDING PART AND LIQUID CRYSTAL DISPLAY EMPLOYING THE SAME**

(75) Inventors: **Sal Chang Yun**, Kumi-shi (KR); **Eun Yeong An**, Kumi-shi (KR)

(73) Assignee: **LG. Philips LCD Co., Ltd.**, Seoul (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 277 days.

(21) Appl. No.: **09/814,828**

(22) Filed: **Mar. 23, 2001**

(65) **Prior Publication Data**

US 2001/0035930 A1 Nov. 1, 2001

(30) **Foreign Application Priority Data**

Mar. 31, 2000 (KR) P2000-17026

(51) **Int. Cl.**[7] **G02F 1/1345**

(52) **U.S. Cl.** **349/149**; 349/150; 349/151; 349/152

(58) **Field of Search** 349/149, 150

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Primary Examiner—John F. Niebling
Assistant Examiner—Angel Roman
(74) *Attorney, Agent, or Firm*—McKenna Long & Aldridge LLP

(57) **ABSTRACT**

A tape carrier package has dummy bending parts that are capable of reducing a brightness difference of a screen. In the tape carrier package, a pad part is connected to a liquid crystal panel. A base film is mounted with an integrated circuit chip for applying a signal to the liquid crystal panel. A dummy bending part is formed by removing the base film between the pad part and the integrated circuit chip to distribute a stress applied to the liquid crystal panel according to a thermal expansion of the pad part.

15 Claims, 7 Drawing Sheets

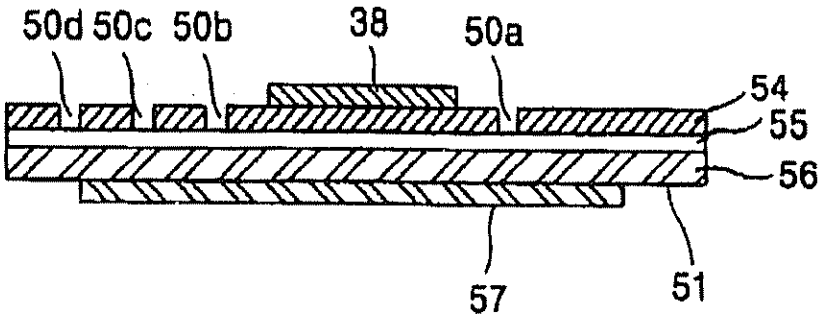


FIG. 1A

CONVENTIONAL ART

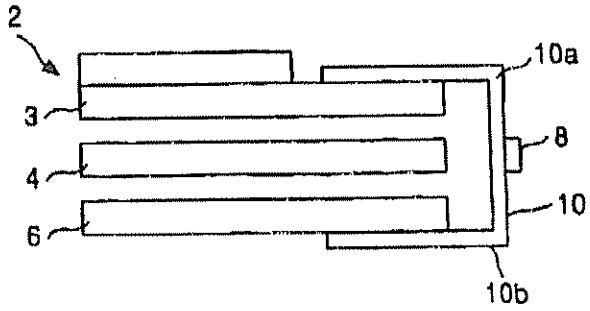


FIG. 1B

CONVENTIONAL ART

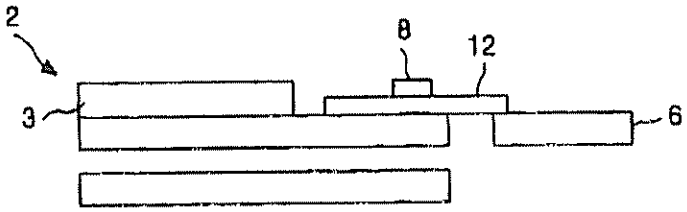


FIG. 2

CONVENTIONAL ART

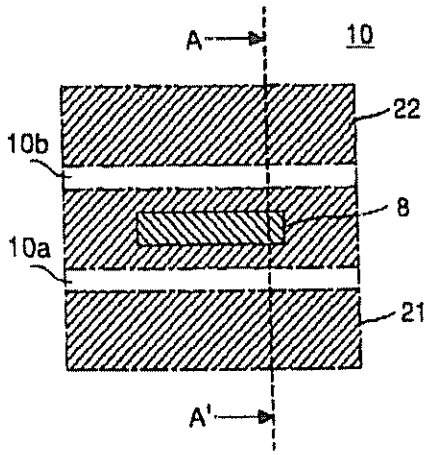


FIG. 3

CONVENTIONAL ART

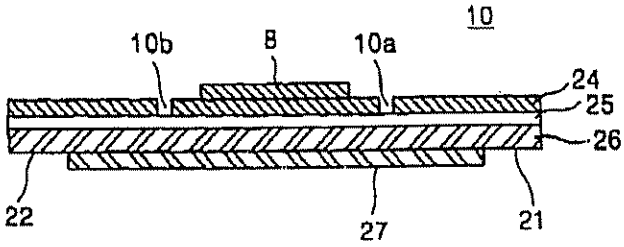


FIG. 4

CONVENTIONAL ART

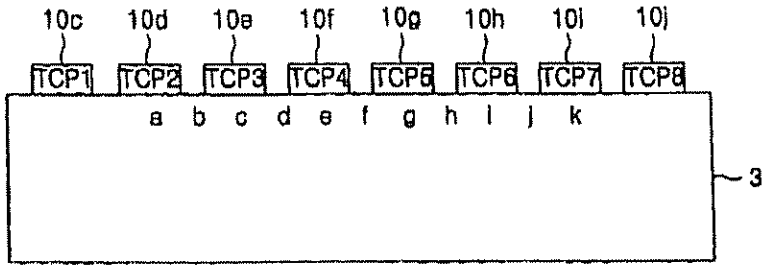


FIG. 5

CONVENTIONAL ART

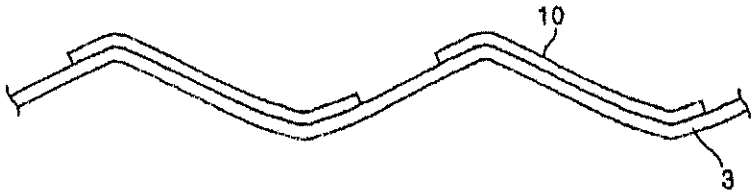


FIG. 6

CONVENTIONAL ART

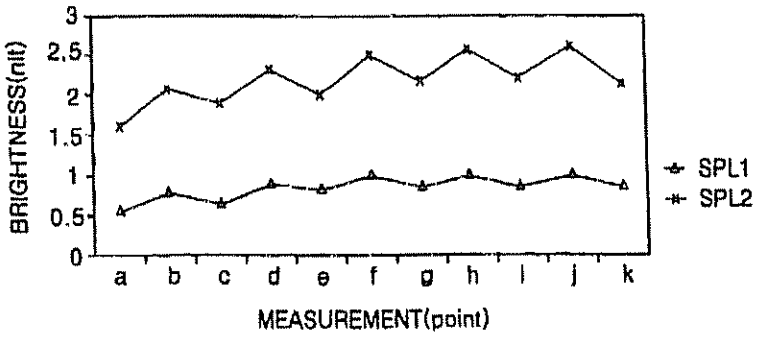


FIG. 7

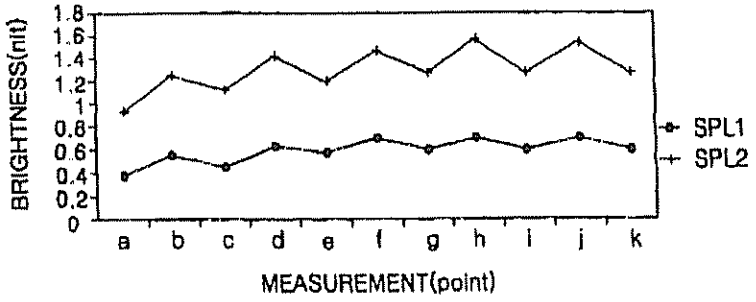


FIG. 8

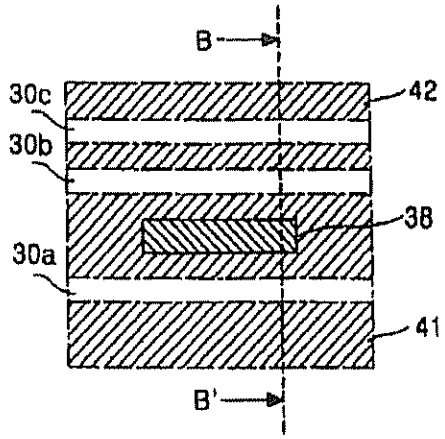


FIG. 9

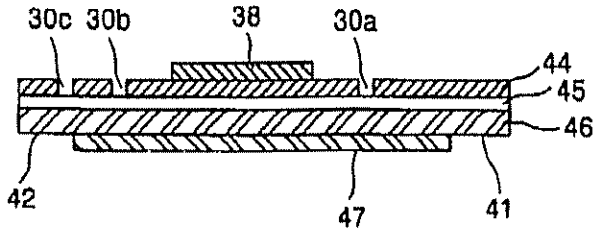


FIG. 10

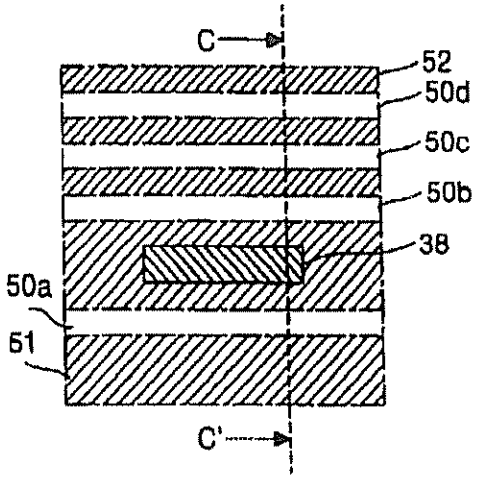


FIG. 11

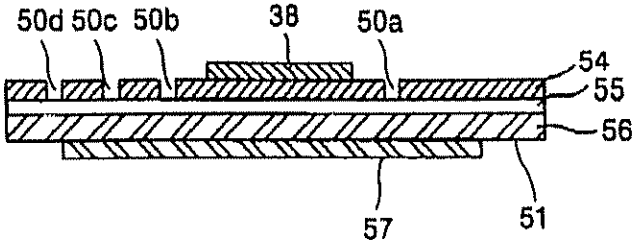


FIG. 12

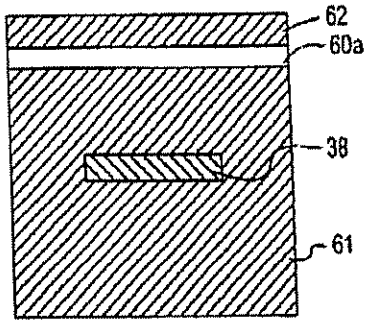
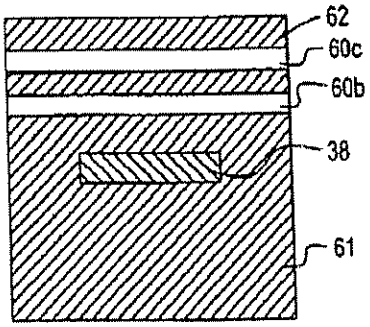


FIG. 13



TAPE CARRIER PACKAGE WITH DUMMY BENDING PART AND LIQUID CRYSTAL DISPLAY EMPLOYING THE SAME

This application claims the benefit of Korean Patent Application No. P2000-17026, filed on Mar 31, 2000, which is hereby incorporated by reference for all purposes as if fully set forth herein.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an apparatus for mounting an integrated circuit on a liquid crystal display, and more particularly to a tape carrier package with a dummy bending part that is capable of reducing a difference in brightness in a screen. Also, the present invention is directed to a liquid crystal display that is capable of reducing a difference in brightness, using said tape carrier package.

2. Description of the Related Art

Generally, a liquid crystal display with an active matrix driving system uses thin film transistors (TFTs) as switching devices to display a natural moving picture. Since such a liquid crystal display can be made into a smaller-size device than the Brown tube, it is commercially available for a monitor such as a portable television or a lap-top personal computer, etc.

The active matrix liquid crystal display displays a picture corresponding to video signals, such as television signals, on a pixel (or picture element) matrix having pixels arranged at each intersection between gate lines and data lines. Each pixel includes a liquid crystal cell for controlling a transmitted light quantity in accordance with a voltage level of a data signal from a data line. The TFT is installed at an intersection between the gate line and the data line to switch a data signal to be transferred to the liquid crystal cell in response to a scanning signal (i.e., a gate pulse) from the gate line.

Such a liquid crystal display requires a number of driving integrated circuits, each hereinafter referred to as a "D-IC", connected to the data lines and the gate lines to apply data signals and scanning signals to the data lines and the gate lines, respectively. The D-ICs are installed between the printed circuit board (PCB) and the liquid crystal panel to apply the data signals and the scanning signals to the data lines and the gate lines of the liquid crystal panel in response to a control signal applied from the PCB. A tape automated bonding (TAB) system has generally been used as a mounting method of the D-ICs that is capable of widening an effective area of the panel and has a relatively simple mounting process.

The TAB method may be divided into a bending type as shown in FIG. 1A, and a flat type as shown in FIG. 1B. The bending-type TAB system as shown in FIG. 1A has been used for a mounting of source and gate drivers of a monitor or a notebook computer. In the bending-type TAB system, a PCB 6 is folded to the rear side of a liquid crystal panel 2 by bending a tape carrier package (TCP) 10 mounted with a D-IC 8 and connected between a lower glass substrate 3 of the liquid crystal panel 2 and the PCB 6. A backlight unit 4 is positioned below the liquid crystal display panel 2. As shown in FIG. 2 and FIG. 3, an adhesive 25 is coated on a base film 24 of the TCP 10, and a lead part 26 is adhered thereon. The lead part 26 made from copper (Cu) is connected to pins of the D-IC 8. On the lead 26 is coated a solder resistor 27 responsible for providing an insulator. At the upper end and the lower end of the base film 24, an input pad part 21 and an output pad part 22 extending from each lead of the lead part 26 are provided. The input pad part 21 is connected to an output signal wiring of the PCB while the output pad part 22 is connected to the gate line or the data line formed on a lower glass substrate 3. Bending parts 10*a* and 10*b* are provided between the input pad part 21 and the D-IC 8 and between the output pad part 22 and the D-IC 8, respectively. The base film 24 is removed from the bending parts 10*a* and 10*b*. The TCP 10 is easily bent with the aid of these bending parts 10*a* and 10*b*.

The flat-type TAB system as shown in FIG. 1B is mainly used to mount gate drivers of a 10.4" or 12.1" small-size notebook computer or monitor. In the flat-type TAB system, a TCP 12 mounted with a D-IC 8 and connected between a lower glass substrate 3 of a liquid crystal panel 2 and a PCB 6 is arranged in parallel to the liquid crystal panel 2. Thus, since the TCP 12 connected between the liquid crystal panel 2 and the PCB 6 is not bent, no bending part is formed.

However, the conventional TAB system has a problem in that a brightness difference is generated between an area where the TCP 10 or 12 is adhered onto the liquid crystal panel 2 and an area where the TCP 10 or 12 is not adhered onto the liquid crystal panel 2. More specifically, as shown in FIG. 4, the TCPs 10*c* to 10*j* are adhered to the edge of the lower glass substrate 3 at a desired spacing, having an anisotropic conductive film (ACF) therebetween under a high temperature and high pressure atmosphere. At this time, the TCPs 10*c* to 10*j* are expanded by heat and then contracted while the heat applied thereto is lowered to a normal temperature after their adhesion. A stress is applied to the lower glass substrate 3 by such TCPs 10*c* to 10*j*. As a result, since the lower glass substrate 3 is deformed into a periodical land/groove shape as shown in FIG. 5, a cell gap between an upper glass substrate (not shown) and the lower glass substrate 3 has a periodical thickness difference. When an experiment using the gray patterns of '7' and '3' was made with respect to two samples of a 12.1" liquid crystal panel as shown in FIG. 4 having SVGA resolution (i.e., 800×600) and a brightness of 300 nit, a brightness difference is periodically generated. As a result of this experiment, a brightness difference between the adhesive areas a, c, e, g, i and k and the non-adhesive areas b, d, f, h and j of the TCPs 10*c* to 10*j* having a difference in the cell gap is indicated in the following Table 1, and in FIGS. 6 and 7. As a brightness measuring device, a 'PR800' model optical measuring-set is used for sensing a brightness level in accordance with a received light amount.

TABLE 1

Sample	Measuring Point	a	b	c	d	e	f	g	h	i	j	k
Sample 1	7-Gray	0.577	0.74	0.679	0.879	0.818	0.956	0.801	0.959	0.829	0.957	0.794
	3-Gray	0.44	0.538	0.491	0.642	0.577	0.703	0.584	0.707	0.604	0.712	0.596

TABLE 1-continued

Sample	Measuring Point	a	b	c	d	e	f	g	h	i	j	k
Sample 2	7-Gray	1.628	2.075	1.892	2.293	1.974	2.165	2.165	2.563	2.217	2.587	2.132
	3-Gray	1.925	1.233	1.089	1.369	1.129	1.464	1.258	1.564	1.291	1.549	1.245

As seen from Table 1, a brightness difference is generated between the adhesive areas a, c, e, g, i and k and the non-adhesive areas b, d, f, h and l of the TCPs 10c to 10*j* In two samples, average brightness differences in the 7 gray pattern and the 3 gray pattern have 0.2691 and 0.1957, respectively. Since a stress applied to the lower glass substrate 3 by the TCPs 10*a* to 10*h* becomes larger as the TCPs 10c to 10*j* become longer or thicker, a brightness difference between the adhesive areas a, c, e, g. i and k and the non-adhesive areas b, d, f. h and l of the TCPs 10c to 10*j* becomes larger Therefore, a strategy capable of reducing a brightness difference caused by the TCPs 10c to 10*j* is required to improve a display quality of the liquid crystal display

FIG 6 is a characteristic diagram of a brightness level detected from the liquid crystal panel shown in FIG. 4 with respect to a 7-gray pattern;

FIG 7 is a characteristic diagram of a brightness level detected from the liquid crystal panel shown in FIG. 4 with respect to a 3-gray pattern;

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a tape carrier package with a dummy bending part that is capable of reducing a brightness difference of the screen.

A further object of the present invention is to provide a liquid crystal display that is adaptive for reducing a brightness difference of the screen

In order to achieve these and other objects of the invention, a tape carrier package according to one aspect of the present invention includes a pad part connected to a liquid crystal panel; a base film mounted with an integrated circuit chip for applying a signal to the liquid crystal panel; and a dummy bending part for distributing a stress applied to the liquid crystal panel according to a thermal expansion of the pad part by removing the base film between the pad part and the integrated circuit chip.

A tape carrier package according another aspect of the present invention includes a base film mounted with an integrated circuit chip for applying a signal to a liquid crystal panel; a pad part extending from the integrated circuit chip to be connected to the liquid crystal panel; at least one bending part in which the base film at a portion where the tape carrier package is folded is removed; and at least one dummy bending part, in which a desired base film at a portion where the tape carrier package is not folded is removed, for reducing a thermal expansion force and a thermal contraction force of the base film parallel to the longitudinal direction of the integrated circuit chip

A liquid crystal display device according to still another aspect of the present invention includes a liquid crystal panel; a tape carrier package connected to the liquid crystal panel; a base film mounted with an integrated circuit chip for applying a signal to the liquid crystal panel; at least one bending part in which the base film at a portion where the tape carrier package is folded is removed; a dummy bending part, in which the base film is removed in a direction perpendicular to terminals of the pad part, for reducing a thermal expansion force and a thermal contraction force generated at the time of thermal-pressing the pad onto the liquid crystal panel; and a printed circuit board connected to an input pad part of the tape carrier package.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects of the invention will be apparent from the following detailed description of the embodiments of the present invention with reference to the accompanying drawings, in which:

FIG. 1A is a sectional view showing the conventional bending-type tape automated bonding (TAB) system;

FIG. 1B is a sectional view showing the conventional flat-type tape automated bonding (TAB) system;

FIG. 2 is a plan view showing the structure of the tape carrier package in FIG 1A;

FIG. 3 is a sectional view of the tape carrier package taken along a line A–A' in FIG 2;

FIG. 4 is a plan view showing the structure of a liquid crystal panel to which tape carrier packages used as a sample for brightness measurement are attached;

FIG 5 depicts a deformation of the lower substrate glass substrate caused by the tape carrier package;

FIG. 6 is a characteristic diagram of a brightness level detected from the liquid crystal panel shown in FIG. 4 with respect to a 7-gray pattern;

FIG. 7 is a characteristic diagram of a brightness level detected from the liquid crystal panel shown in FIG. 4 with respect to a 3-gray pattern;

FIG. 8 is a plan view showing the structure of a tape carrier package according to a first embodiment of the present invention;

FIG. 9 is a sectional view of the tape carrier package taken along line B–B' in FIG. 8;

FIG. 10 is a plan view showing the structure of a tape carrier package according to a second embodiment of the present invention;

FIG. 11 is a sectional view of the tape carrier package taken along line C–C' in FIG 10;

FIG 12 is a plan view showing the structure of a tape carrier package according to a third embodiment of the present invention; and

FIG. 13 is a plan view showing the structure of a tape carrier package according to a fourth embodiment of the present invention

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 8 and FIG. 9, there is shown a tape carrier package (TCP) according to a first embodiment of the present invention, which is applicable to the bending-type

TAB system. The TCP includes a D-IC 38 mounted on a base film 44, a first bending part 30*a* provided between an input pad part 41 and the D-IC 38, and a second bending part 30*b* and a dummy bending part 30c provided between an output pad part 42 and the D-IC 38 in parallel. The D-IC 38 plays a role to apply scanning signals, or data, to gate lines or data lines of a liquid crystal panel 2. Output pins of the D-IC 38 are connected to a lead part 46 adhered onto the base film 44 by means of an adhesive 45.

The lead part 46 is coated with a solder resistor 47 responsible for providing an insulator. At the input pad part 41 are formed pads extending from the lead part 46 to be connected to an output signal wiring of a PCB 6. Between the input pad part 41 and the D-IC 38 is provided the first bending part 30*a* in which the base film 44 is removed. The TCP between the PCB 6 and the D-IC 38 is easily bent by the first bending part 30*a*. At the output pad part 42 are provided pads extending from the lead part 46 to be connected to pads formed at the edge of the lower glass substrate 3. Between the output pad part 42 and the D-IC 38 is provided the second bending part 30*b* and the dummy bending part 30c in which the base film 44 are removed. The TCP between the liquid crystal panel 2 and the D-IC 38 is easily bent by the second bending part 30*b*. The dummy bending part 30c reduces the TCP area to which heat is applied at the time of adhering the TCP to the lower glass substrate. Accordingly, since the amount of thermal expansion of the TCP is reduced, the stress applied to the lower glass substrate 3 by the TCP is distributed and thus reduced.

Referring to FIG. 10 and FIG. 11, there is shown a tape carrier package (TCP) according to a second embodiment of the present invention, which is applicable to the bending-type TAB system. The TCP includes a D-IC 38 mounted on a base film 54, a first bending part 50*a* provided between an input pad part 51 and the D-IC 38, and a second bending part 50*b*, a first dummy bending part 50c and a second dummy bending part 50*d* provided between an output pad part 52 and the D-IC 38 in parallel to each other. At the input pad part 51 are formed pads extending from the lead part 56 to be connected to an output signal wiring of a PCB 6. Between the input pad part 51 and the D-IC 38 is provided the first bending part 50*a* in which the base film 54 is removed. The TCP between the PCB 6 and the D-IC 38 is easily bent with the aid of the first bending part 50*a*. At the output pad part 52 are provided pads extending from the lead part 56 to be connected to pads formed at the edge of the lower glass substrate 3. Between the output pad part 52 and the D-IC 38 are provided the second bending part 50*b*, the first dummy bending part 50c and the second dummy bending part 50*d* in which each of the base film 54 is removed. The TCP between the liquid crystal panel 2 and the D-IC 38 is easily bent by the second bending part 50*b*. The first and second dummy bending parts 50c and 50*d* play a role to distribute and reduce a stress applied to the lower glass substrate 3 by the TCP. A TCP area to which heat is applied at the time of adhering the TCP onto the lower glass substrate 3 is reduced more than in the TCP of FIG. 8, with the aid of the second dummy bending part 50*d*.

Referring to FIG. 12 and FIG. 13, there are shown tape carrier packages (TCPs) according to other embodiments of the present invention, which are applicable to the flat-type TAB system. Each of the TCPs includes a D-IC 38 mounted on a base film 54, and at least one of dummy bending part 60*a* or 60*b* and 60*c* between an output pad part 62 and the D-IC 38. At the input pad part 61 are formed pads extending from the lead part 56 to be connected to an output signal wiring of a PCB 6. At the output pad part 62 are provided pads extending from the lead part 56 to be connected to pads formed at the edge of the lower glass substrate 3. Between the output pad part 62 and the D-IC 38 are provided one or two dummy bending parts 60*a* or 60*b* and 60c in which the base film 54 is removed. The dummy bending parts 60*a*, 60*b* and 60c play a role to distribute and reduce a stress applied to the lower glass substrate 3 by the TCP.

As described above, according to the present invention, the base film close to the output pads adhered onto the glass substrate of the liquid crystal panel is removed, so that a stress applied to the glass substrate by the TCP is distributed and thus reduced. As a result, the TCP with dummy bending parts according to the present invention can reduce a brightness difference of the screen. Furthermore, according to the present invention, the TCP having the dummy bending parts is adhered, so that a stress applied to the glass substrate as well as a cell gap difference between the adhesive area and the non-adhesive area of the TCP is reduced to that extent. Accordingly, the liquid crystal display according to the present invention maintains the cell gap constantly at the adhesive area and the non-adhesive area of the TCP, so that it is capable of reducing a brightness difference of the screen.

Although the present invention has been explained by the embodiments shown in the drawings described above, it should be understood to the ordinary skilled person in the art that the invention is not limited to the embodiments, but rather that various changes or modifications thereof are possible without departing from the spirit of the invention. Accordingly, the scope of the invention shall be determined only by the appended claims and their equivalents.

What is claimed is:

1. A liquid crystal display device, comprising:

a liquid crystal panel;

a printed circuit board; and

a tape carrier package connected to the liquid crystal panel and the printed circuit board, the tape carrier package comprising:

a base film mounted with an integrated circuit chip for applying a signal to the liquid crystal panel;

an output pad part extending from the integrated circuit chip and having terminals connected to the liquid crystal panel;

a dummy bending part in which a portion of the base film is removed in a direction perpendicular to the terminals of the output pad part for reducing a thermal expansion force and a thermal contraction force generated when thermal-pressing the output pad part onto the liquid crystal panel;

a first bending part in which a second portion of the base film existing at a bent position between the dummy bending part and the integrated circuit chip is removed; and

an input pad part extending from the integrated circuit chip and having terminals connected to the printed circuit board,

wherein the dummy bending part is formed at a position, close to any one of the output pad part or the input pad part, where the tape carrier package is not folded.

2. A liquid crystal display device, comprising:

a liquid crystal panel;

a printed circuit board; and

a tape carrier package connected to the liquid crystal panel and the printed circuit board, the tape carrier package comprising:

a base film mounted with an integrated circuit chip for applying a signal to the liquid crystal panel;

an output pad part extending from the integrated circuit chip and having terminals connected to the liquid crystal panel;

a dummy bending part in which a portion of the base film is removed in a direction perpendicular to the terminals of the output pad part for reducing a thermal expansion force and a thermal contraction force generated when thermal-pressing the output pad part onto the liquid crystal panel;

a first bending part in which a second portion of the base film existing at a bent position between the dummy bending part and the integrated circuit chip is removed;

an input pad part extending from the integrated circuit chip and having terminals connected to the printed circuit board; and

a second bending part in which a third portion of the base film existing at a bent position between the input pad part and the integrated circuit chip is removed.

3. The liquid crystal display panel of claim 2, wherein the tape carrier package further comprises a second dummy bending part in which a fourth portion of the base film is removed in a direction perpendicular to the terminals of the output pad part.

4. The liquid crystal display device of claim 1, wherein the tape carrier package further comprises a second dummy bending part in which a third portion of the base film is removed in a direction perpendicular to the terminals of the output pad part.

5. A tape carrier package, comprising:

a pad part for connection to a liquid crystal panel;

a base film mounted with an integrated circuit chip for applying a signal to the liquid crystal panel; and

a dummy bending part for distributing a stress applied to the liquid crystal panel according to a thermal expansion of the pad part by removing a portion of the base film between the pad part and the integrated circuit chip,

wherein the dummy bending part is formed at a position, close to the pad part, where the tape carrier package is not folded.

6. The tape carrier package according to claim 5, further comprising a first bending part in which a second portion of the base film is removed at a bent position between the dummy bending part and the integrated circuit chip.

7. The tape carrier package according to claim 6, further comprising a second pad part for connection to a printed circuit board.

8. A tape carrier package, comprising:

a pad part for connection to a liquid crystal panel;

a base film mounted with an integrated circuit chip for applying a signal to the liquid crystal panel;

a dummy bending part for distributing a stress applied to the liquid crystal panel according to a thermal expansion of the pad part by removing a portion of the base film between the pad part and the integrated circuit chip;

a first bending part in which a second portion of the base film is removed at a bent position between the dummy bending part and the integrated circuit chip;

a second pad part for connection to a printed circuit board; and

a second bending part in which a third portion of the base film is removed at a bent position between the second pad and the integrated circuit chip.

9. The tape carrier package according to claim 5, further comprising a second pad part for connection to a printed circuit board.

10. The tape carrier package according to claim 5, further comprising a second dummy bending part in which a second portion of the base film is removed.

11. The tape carrier package according to claim 10, further comprising a first bending part in which a third portion of the base film is removed at a bent position between the dummy bending part and the integrated circuit chip.

12. The tape carrier package according to claim 11, further comprising a second pad part for connection to a printed circuit board.

13. A tape carrier package, comprising:

a pad part for connection to a liquid crystal panel;

a base film mounted with an integrated circuit chit for applying a signal to the liquid crystal panel;

a dummy bending part for distributing a stress applied to the liquid crystal panel according to a thermal expansion of the pad part by removing a portion of the base film between the pad part and the integrated circuit chip;

a second dummy bending part in which a second portion of the base film is removed;

a first bending part in which a third portion of the base film is removed at a bent position between the dummy bending part and the integrated circuit chip;

a second pad part for connection to a printed circuit board; and

a second bending part in which a fourth portion of the base film is removed at a bent position between the second pad and the integrated circuit chip.

14. A tape carrier package, comprising:

a base film mounted with an integrated circuit chip for applying a signal to a liquid crystal panel;

a pad part extending from the integrated circuit chip to be connected to the liquid crystal panel;

at least one bending part in which a portion of the base film is removed at an area where the tape carrier package is folded; and

at least one dummy bending part. in which a second portion of the base film is removed at a portion where the tape carrier package is not folded, thereby reducing a thermal expansion force and a thermal contraction force of the base film parallel to a longitudinal direction of the integrated circuit chip.

15. The tape carrier package according to claim 14, wherein said dummy bending part is positioned on the pad part.

* * * * *

PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
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ABSTRACT

A tape carrier package has dummy bending parts that are capable of reducing a brightness difference of a screen. In the tape carrier package, a pad part is connected to a liquid crystal panel. A base film is mounted with an integrated circuit chip for applying a signal to the liquid crystal panel. A dummy bending part is formed by removing the base film between the pad part and the integrated circuit chip to distribute a stress applied to the liquid crystal panel according to a thermal expansion of the pad part.

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-- PATENT --

UNITED STATES APPLICATION OF

SAI CHANG YUN

AND

EUN YEONG AN

FOR

TAPE CARRIER PACKAGE WITH DUMMY BENDING PART AND LIQUID CRYSTAL DISPLAY EMPLOYING THE SAME

TAPE CARRIER PACKAGE WITH DUMMY BENDING PART AND LIQUID CRYSTAL DISPLAY EMPLOYING THE SAME

This application claims the benefit of Korean Patent Application No. P2000-17026, filed on March 31, 2000, which is hereby incorporated by reference for all purposes as if fully set forth herein.

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to an apparatus for mounting an integrated circuit on a liquid crystal display, and more particularly to a tape carrier package with a dummy bending part that is capable of reducing a difference in brightness in a screen. Also, the present invention is directed to a liquid crystal display that is capable of reducing a difference in brightness, using said tape carrier package.

Description of the Related Art

Generally, a liquid crystal display with an active matrix driving system uses thin film transistors (TFTs) as switching devices to display a natural moving picture. Since such a liquid crystal display can be made into a smaller-size device than the Brown tube, it is commercially available for a monitor such as a portable television or a lap-top personal computer, etc.

The active matrix liquid crystal display displays a picture corresponding to video signals, such as television signals, on a pixel (or picture element) matrix having pixels arranged at each intersection between gate lines and data lines. Each pixel includes a liquid crystal cell for controlling a transmitted light quantity in accordance with a voltage level of a data signal from a data line. The TFT is installed at an intersection between the gate line and the data line to switch a data signal to be transferred to the liquid crystal cell in response

to a scanning signal (i.e., a gate pulse) from the gate line.

Such a liquid crystal display requires a number of driving integrated circuits, each hereinafter referred to as a "D-IC", connected to the data lines and the gate lines to apply data signals and scanning signals to the data lines and the gate lines, respectively. The D-ICs are installed between the printed circuit board (PCB) and the liquid crystal panel to apply the data signals and the scanning signals to the data lines and the gate lines of the liquid crystal panel in response to a control signal applied from the PCB. A tape automated bonding (TAB) system has generally been used as a mounting method of the D-ICs that is capable of widening an effective area of the panel and has a relatively simple mounting process.

The TAB method may be divided into a bending type as shown in Fig. 1A, and a flat type as shown in Fig. 1B. The bending-type TAB system as shown in Fig. 1A has been used for a mounting of source and gate drivers of a monitor or a notebook computer. In the bending-type TAB system, a PCB 6 is folded to the rear side of a liquid crystal panel 2 by bending a tape carrier package (TCP) 10 mounted with a D-IC 8 and connected between a lower glass substrate 3 of the liquid crystal panel 2 and the PCB 6. As shown in Fig. 2 and Fig. 3, an adhesive 25 is coated on a base film 24 of the TCP 10, and a lead part 26 is adhered thereon. The lead part 26 made from copper (Cu) is connected to pins of the D-IC 8. On the lead 26 is coated a solder resistor 27 responsible for providing an insulator. At the upper end and the lower end of the base film 24, an input pad part 21 and an output pad part 22 extending from each lead of the lead part 26 are provided. The input pad part 21 is connected to an output signal wiring of the PCB while the output pad part 22 is connected to the gate line or the data line formed on a lower glass substrate 3. Bending parts 10a and 10b are provided between the input pad part 21 and the D-IC 8 and between the output pad part 22 and the D-IC 8, respectively. The base film 24 is removed from the bending parts 10a and 10b. The TCP 10 is easily bent with the aid of these bending parts 10a and 10b.

The flat-type TAB system as shown in Fig. 1B is mainly used to mount gate drivers of a 10.4" or 12.1" small-size notebook computer or monitor. In the flat-type TAB system, a TCP 12 mounted with a D-IC 8 and connected between a lower glass substrate 3 of a liquid crystal panel 3 and a PCB 6 is arranged in parallel to the liquid crystal panel 2. Thus, since the TCP 12 connected between the liquid crystal panel 2 and the PCB 6 is not bent, no bending part is formed.

However, the conventional TAB system has a problem in that a brightness difference is generated between an area where the TCP 10 or 12 is adhered onto the liquid crystal panel 2 and an area where the TCP 10 or 12 is not adhered onto the liquid crystal panel 2. More specifically, as shown in Fig. 4, the TCPs 10c to 10j are adhered to the edge of the lower glass substrate 3 at a desired spacing, having an anisotropic conductive film (ACF) therebetween under a high temperature and high pressure atmosphere. At this time, the TCPs 10c to 10j are expanded by heat and then contracted while the heat applied thereto is lowered to a normal temperature after their adhesion. A stress is applied to the lower glass substrate 3 by such TCPs 10c to 10j. As a result, since the lower glass substrate 3 is deformed into a periodical land/groove shape as shown in Fig. 5, a cell gap between an upper glass substrate (not shown) and the lower glass substrate 3 has a periodical thickness difference. When an experiment using the gray patterns of '7' and '3' was made with respect to two samples of a 12.1" liquid crystal panel as shown in Fig. 4 having SVGA resolution (i.e., 800× 600) and a brightness of 300 nit, a brightness difference is periodically generated. As a result of this experiment, a brightness difference between the adhesive areas a, c, e, g, i and k and the non-adhesive areas b, d, f, h and i of the TCPs 10c to 10j having a difference in the cell gap is indicated in the following Table 1, and in Figs. 6 and 7. As a brightness measuring device, a 'PR800' model optical measuring-set is used for sensing a brightness level in accordance with a received light amount.

Table 1

Measuring Sample	Point	a	b	c	d	e	f
Sample1	7-Gray	0.577	0.74	0.679	0.879	0.818	0.956
	3-Gray	0.44	0.538	0.491	0.642	0.577	0.703
Sample2	7-Gray	1.628	2.075	1.892	2.293	1.974	2.165
	3-Gray	1.925	1.233	1.089	1.369	1.129	1.464

Measuring Sample	Point	g	h	i	j	k
Sample1	7-Gray	0.801	0.959	0.829	0.957	0.794
	3-Gray	0.584	0.707	0.604	0.712	0.596
Sample2	7-Gray	2.165	2.563	2.217	2.587	2 132
	3-Gray	1.258	1.564	1.291	1.549	1.245

As seen from Table 1, a brightness difference is generated between the adhesive areas a, c, e, g, i and k and the non-adhesive areas b, d, f, h and 1 of the TCPs 10c to 10j. In two samples, average brightness differences in the 7 gray pattern and the 3 gray pattern have 0.2691 and 0.1957, respectively. Since a stress applied to the lower glass substrate 3 by the TCPs 10a to 10h becomes larger as the TCPs 10c to 10j become longer or thicker, a brightness difference between the adhesive areas a, c, e, g, i and k and the non-adhesive areas b, d, f, h and 1 of the TCPs 10c to 10j becomes larger. Therefore, a strategy capable of

reducing a brightness difference caused by the TCPs 10c to 10j is required to improve a display quality of the liquid crystal display.

Fig. 6 is a characteristic diagram of a brightness level detected from the liquid crystal panel shown in Fig. 4 with respect to a 7-gray pattern;

Fig. 7 is a characteristic diagram of a brightness level detected from the liquid crystal panel shown in Fig. 4 with respect to a 3-gray pattern;

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a tape carrier package with a dummy bending part that is capable of reducing a brightness difference of the screen.

A further object of the present invention is to provide a liquid crystal display that is adaptive for reducing a brightness difference of the screen.

In order to achieve these and other objects of the invention, a tape carrier package according to one aspect of the present invention includes a pad part connected to a liquid crystal panel; a base film mounted with an integrated circuit chip for applying a signal to the liquid crystal panel; and a dummy bending part for distributing a stress applied to the liquid crystal panel according to a thermal expansion of the pad part by removing the base film between the pad part and the integrated circuit chip.

A tape carrier package according another aspect of the present invention includes a base film mounted with an integrated circuit chip for applying a signal to a liquid crystal panel; a pad part extending from the integrated circuit chip to be connected to the liquid crystal panel; at least one bending part in which the base film at a portion where the tape carrier package is folded is removed; and at least one dummy bending part, in which a desired base film at a portion where the tape carrier package is not folded is removed, for reducing a thermal expansion force and a thermal contraction force of the base film parallel to the longitudinal direction of the integrated circuit chip.

A liquid crystal display device according to still another aspect of the present invention includes a liquid crystal panel; a tape carrier package connected to the liquid crystal panel; a base film mounted with an integrated circuit chip for applying a signal to the liquid crystal panel; at least one bending part in which the base film at a portion where the tape carrier package is folded is removed; a dummy bending part, in which the base film is removed in a direction perpendicular to terminals of the pad part, for reducing a thermal expansion force and a thermal contraction force generated at the time of thermal-pressing the pad onto the liquid crystal panel; and a printed circuit board connected to an input pad part of the tape carrier package.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects of the invention will be apparent from the following detailed description of the embodiments of the present invention with reference to the accompanying drawings, in which:

Fig. 1A is a sectional view showing the conventional bending-type tape automated bonding (TAB) system;

Fig. 1B is a sectional view showing the conventional flat-type tape automated bonding (TAB) system;

Fig. 2 is a plan view showing the structure of the tape carrier package in Fig. 1A;

Fig. 3 is a sectional view of the tape carrier package taken along a line A-A' in Fig. 2;

Fig. 4 is a plan view showing the structure of a liquid crystal panel to which tape carrier packages used as a sample for brightness measurement are attached;

Fig. 5 depicts a deformation of the lower substrate glass substrate caused by the tape carrier package;

Fig. 6 is a characteristic diagram of a brightness level detected from the liquid crystal panel shown in Fig. 4 with respect to a 7-gray pattern;

Fig. 7 is a characteristic diagram of a brightness level detected from the liquid crystal panel shown in Fig. 4 with respect to a 3-gray pattern;

Fig. 8 is a plan view showing the structure of a tape carrier package according to a first embodiment of the present invention;

Fig. 9 is a sectional view of the tape carrier package taken along line B-B' in Fig. 8;

Fig. 10 is a plan view showing the structure of a tape carrier package according to a second embodiment of the present invention;

Fig. 11 is a sectional view of the tape carrier package taken along line C-C' in Fig. 10;

Fig. 12 is a plan view showing the structure of a tape carrier package according to a third embodiment of the present invention; and

Fig. 13 is a plan view showing the structure of a tape carrier package according to a fourth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Fig. 8 and Fig. 9, there is shown a tape carrier package (TCP) according to a first embodiment of the present invention, which is applicable to the bending-type TAB system. The TCP includes a D-IC 38 mounted on a base film 44, a first bending part 30a provided between an input pad part 41 and the D-IC 38, and a second bending part 30b and a dummy bending part 30c provided between an output pad part 42 and the D-IC 38 in parallel. The D-IC 38 plays a role to apply scanning signals, or data, to gate lines or data lines of a liquid crystal panel 2. Output pins of the D-IC 38 are connected to a lead part 46 adhered onto the base film 44 by means of an adhesive 45.

The lead part 46 is coated with a solder resistor 47 responsible for providing an insulator. At the input pad part 41 are formed pads extending from the lead part 46 to be connected to an output signal wiring of a PCB 6. Between the input pad part 41 and the D-IC 38 is provided the first bending part 30a in which the base film 44 is removed. The TCP

between the PCB 6 and the D-IC 38 is easily bent by the first bending part 30a. At the output pad part 42 are provided pads extending from the lead part 46 to be connected to pads formed at the edge of the lower glass substrate 3. Between the output pad part 42 and the D-IC 38 is provided the second bending part 30b and the dummy bending part 30c in which the base film 44 are removed. The TCP between the liquid crystal panel 2 and the D-IC 38 is easily bent by the second bending part 30b. The dummy bending part 30c reduces the TCP area to which heat is applied at the time of adhering the TCP to the lower glass substrate. Accordingly, since the amount of thermal expansion of the TCP is reduced, the stress applied to the lower glass substrate 3 by the TCP is distributed and thus reduced.

Referring to Fig. 10 and Fig. 11, there is shown a tape carrier package (TCP) according to a second embodiment of the present invention, which is applicable to the bending-type TAB system. The TCP includes a D-IC 38 mounted on a base film 54, a first bending part 50a provided between an input pad part 51 and the D-IC 38, and a second bending part 50b, a first dummy bending part 50c and a second dummy bending part 50d provided between an output pad part 52 and the D-IC 38 in parallel to each other. At the input pad part 51 are formed pads extending from the lead part 56 to be connected to an output signal wiring of a PCB 6. Between the input pad part 51 and the D-IC 38 is provided the first bending part 50a in which the base film 54 is removed. The TCP between the PCB 6 and the D-IC 38 is easily bent with the aid of the first bending part 50a. At the output pad part 52 are provided pads extending from the lead part 56 to be connected to pads formed at the edge of the lower glass substrate 3. Between the output pad part 52 and the D-IC 38 are provided the second bending part 50b, the first dummy bending part 50c and the second dummy bending part 50d in which each of the base film 54 is removed. The TCP between the liquid crystal panel 2 and the D-IC 38 is easily bent by the second bending part 50b. The first and second dummy bending parts 50c and 50d play a role to distribute and reduce a

stress applied to the lower glass substrate 3 by the TCP. A TCP area to which heat is applied at the time of adhering the TCP onto the lower glass substrate 3 is reduced more than in the TCP of Fig. 8, with the aid of the second dummy bending part 50d.

Referring to Fig. 12 and Fig. 13, there are shown tape carrier packages (TCPs) according to other embodiments of the present invention, which are applicable to the flat-type TAB system. Each of the TCPs includes a D-IC 38 mounted on a base film 54, and at least one of dummy bending part 60a or 60b and 60c between an output pad part 62 and the D-IC 38. At the input pad part 61 are formed pads extending from the lead part 56 to be connected to an output signal wiring of a PCB 6. At the output pad part 62 are provided pads extending from the lead part 56 to be connected to pads formed at the edge of the lower glass substrate 3. Between the output pad part 62 and the D-IC 38 are provided one or two dummy bending parts 60a or 60b and 60c in which the base film 54 is removed. The dummy bending parts 60a, 60b and 60c play a role to distribute and reduce a stress applied to the lower glass substrate 3 by the TCP.

As described above, according to the present invention, the base film close to the output pads adhered onto the glass substrate of the liquid crystal panel is removed, so that a stress applied to the glass substrate by the TCP is distributed and thus reduced. As a result, the TCP with dummy bending parts according to the present invention can reduce a brightness difference of the screen. Furthermore, according to the present invention, the TCP having the dummy bending parts is adhered, so that a stress applied to the glass substrate as well as a cell gap difference between the adhesive area and the non-adhesive area of the TCP is reduced to that extent. Accordingly, the liquid crystal display according to the present invention maintains the cell gap constantly at the adhesive area and the non-adhesive area of the TCP, so that it is capable of reducing a brightness difference of the screen.

Although the present invention has been explained by the embodiments shown in the

drawings described above, it should be understood to the ordinary skilled person in the art that the invention is not limited to the embodiments, but rather that various changes or modifications thereof are possible without departing from the spirit of the invention. Accordingly, the scope of the invention shall be determined only by the appended claims and their equivalents.

What is claimed is:

1. A liquid crystal display device, comprising:

a liquid crystal panel;

a printed circuit board; and

a tape carrier package connected to the liquid crystal panel and the printed circuit board, the tape carrier package comprising,

a base film mounted with an integrated circuit chip for applying a signal to the liquid crystal panel,

an output pad part extending from the integrated circuit chip and having terminals connected to the liquid crystal panel,

a dummy bending part in which a portion of the base film is removed in a direction perpendicular to the terminals of the output pad part for reducing a thermal expansion force and a thermal contraction force generated when thermal-pressing the output pad part onto the liquid crystal panel,

a first bending part in which a second portion of the base film existing at a bent position between the dummy bending part and the integrated circuit chip is removed, and

an input pad part extending from the integrated circuit chip and having terminals connected to the printed circuit board.

2. The liquid crystal display device of claim 1, wherein the tape carrier package further comprises a second bending part in which a third portion of the base film existing at a bent position between the input pad part and the integrated circuit chip is removed.

3. The liquid crystal display panel of claim 2, wherein the tape carrier package further comprises a second dummy bending part in which a fourth portion of the base film is removed in a direction perpendicular to the terminals of the output pad part.

4. The liquid crystal display device of claim 1, wherein the tape carrier package further comprises a second dummy bending part in which a third portion of the base film is removed in a direction perpendicular to the terminals of the output pad part.

5. A tape carrier package, comprising:

a pad part for connection to a liquid crystal panel;

a base film mounted with an integrated circuit chip for applying a signal to the liquid crystal panel; and

a dummy bending part for distributing a stress applied to the liquid crystal panel according to a thermal expansion of the pad part by removing a portion of the base film between the pad part and the integrated circuit chip.

6. The tape carrier package according to claim 5, further comprising a first bending part in which a second portion of the base film is removed at a bent position between the dummy bending part and the integrated circuit chip.

7. The tape carrier package according to claim 6, further comprising a second pad part for connection to a printed circuit board.

8. The tape carrier package according to claim 7, further comprising a second bending part in which a third portion of the base film is removed at a bent position between the second

pad and the integrated circuit chip.

9. The tape carrier package according to claim 5, further comprising a second pad part for connection to a printed circuit board.

10. The tape carrier package according to claim 5, further comprising a second dummy bending part in which a second portion of the base film is removed.

11. The tape carrier package according to claim 10, further comprising a first bending part in which a third portion of the base film is removed at a bent position between the dummy bending part and the integrated circuit chip.

12. The tape carrier package according to claim 11, further comprising a second pad part for connection to a printed circuit board.

13 The tape carrier package according to claim 12, further comprising a second bending part in which a fourth portion of the base film is removed at a bent position between the second pad and the integrated circuit chip.

14. A tape carrier package, comprising:

a base film mounted with an integrated circuit chip for applying a signal to a liquid crystal panel;

a pad part extending from the integrated circuit chip to be connected to the liquid crystal panel;

at least one bending part in which a portion of the base film is removed at an area

where the tape carrier package is folded; and

at least one dummy bending part, in which a second portion of the base film is removed at a portion where the tape carrier package is not folded, thereby reducing a thermal expansion force and a thermal contraction force of the base film parallel to a longitudinal direction of the integrated circuit chip.

15. The tape carrier package according to claim 14, wherein said dummy bending part is positioned on the pad part.

Docket No.: 8733.246.00

Declaration, Power of Attorney and Petition

WE (I) the undersigned inventor(s), hereby declare(s) that:

My residence, post office address and citizenship are as stated below next to my name,

We (I) believe that we are (I am) the original, first, and joint (sole) inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled

TAPE CARRIER PACKAGE WITH DUMMY BENDING PART AND LIQUID CRYSTAL DISPLAY EMPLOYING THE SAME

the specification of which

- ■ is attached hereto.
- ☐ was filed on
  as Application Serial No.
  and amended on
- ☐ was filed as PCT international application
  Number
  on
  and was amended under PCT Article 19
  on (if applicable).

We (I) hereby state that we (I) have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

We (I) acknowledge the duty to disclose information known to be material to the patentability of this application as defined in Section 1.56 of Title 37 Code of Federal Regulations.

We (I) hereby claim foreign priority benefits under 35 U.S.C. ` 119(a)-(d) or ` 365(b) of any foreign application(s) for patent or inventor's certificate, or ` 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed. Prior Foreign Application(s)

Application No.	Country	Day/Month/Year	Priority Claimed
P2000-17026	**KOREA**	**31 March 2000**	■ Yes ☐ No
			☐ Yes ☐ No
			☐ Yes ☐ No

Yes No

We (I) hereby claim the benefit under Title 35, United States Code, ` 119(c) of any United States provisional application(s) listed below.

(Application Number) (Filing Date)

(Application Number) (Filing Date)

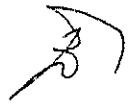
We (I) hereby claim the benefit under 35 U.S.C. ` 120 of any United States application(s), or ` 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. ` 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR ` 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

Application Serial No.	Filing Date	Status (pending, patented, abandoned)

And we (I) hereby appoint Song K. Jung, Reg. No. 35,210; John M. Kelly, Reg. No. 33,920; Kenneth D. Springer, Reg. No. 39,843; and Rebecca A. Goldman, Reg. No. 41,786 and as our (my) attorneys, with full powers of substitution and revocation, to prosecute this application and to transact all business in the Patent Office connected therewith; and we (I) hereby request that all correspondence regarding this application be sent to Song K. Jung of Long Aldridge & Norman LLP, Attorneys At Law, 6th Floor, 701 Pennsylvania Avenue, N.W., Washington, D.C. 20004.

We (I) declare that all statements made herein of our (my) own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Sai Chang YUN
NAME OF FIRST SOLE INVENTOR



Signature of Inventor

Residence: #1003, The second Igu-royal APT
Hyungkok-dong 168-6
Kumi-shi, Kyungsangbuk-do KOREA

Citizen of: Republic of Korea

Post Office Address: Same As Above

Date

Dec. 08. 2000

Eun Yeong AN

NAME OF SECOND JOINT INVENTOR

E. Y. AN

Signature of Inventor

Dec. 08. 2000

Date

Residence: Circuit-layout Team,
LG Philips LCD, 642-3, Jinpyung-dong
Kyungsangbuk-do, Kumi-shi, KOREA

Citizen of: Republic of Korea

Post Office Address: Same As Above

FIG. 1A

CONVENTIONAL ART

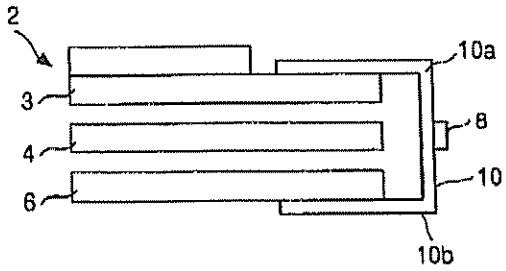


FIG. 1B

CONVENTIONAL ART

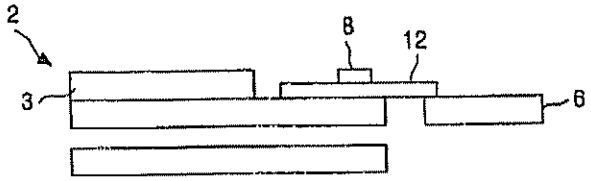


FIG. 2

CONVENTIONAL ART

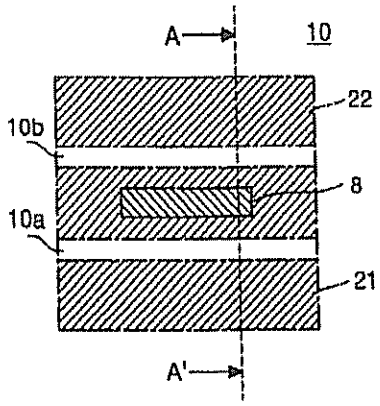


FIG. 3

CONVENTIONAL ART

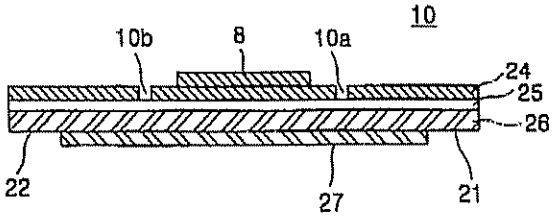


FIG. 4

CONVENTIONAL ART

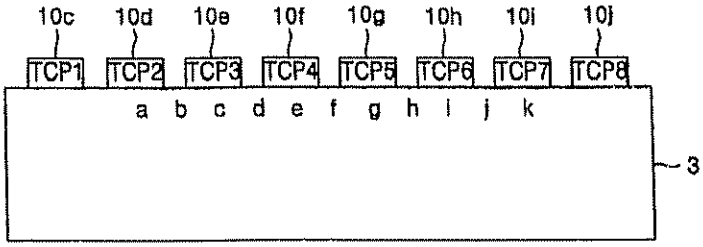


FIG. 5

CONVENTIONAL ART

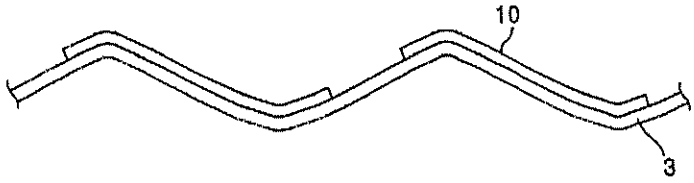


FIG. 6

CONVENTIONAL ART

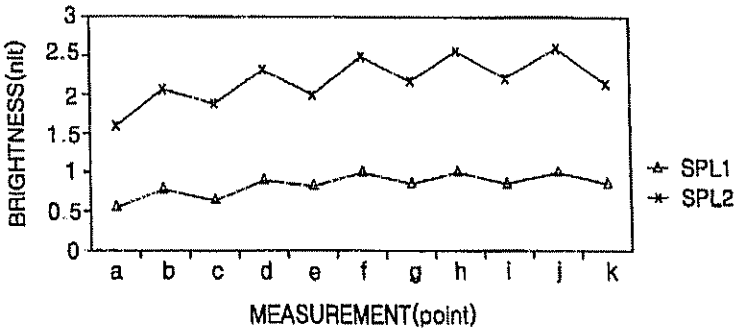


FIG. 7

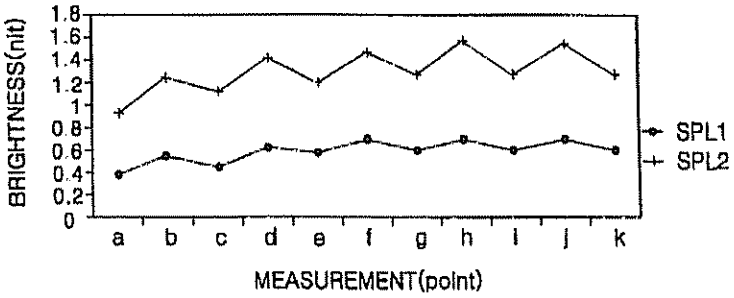


FIG. 8

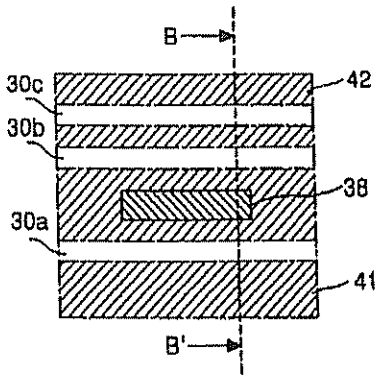


FIG. 9

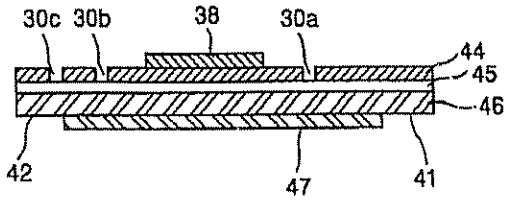


FIG. 10

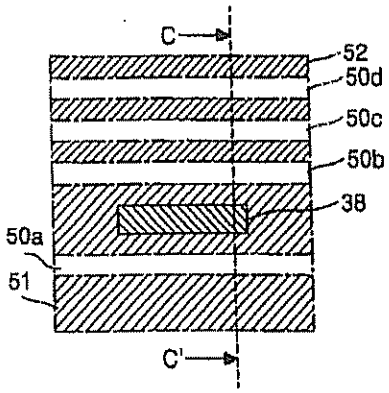


FIG. 11

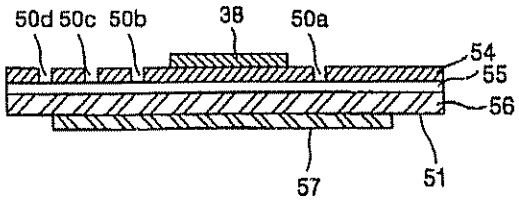


FIG. 12

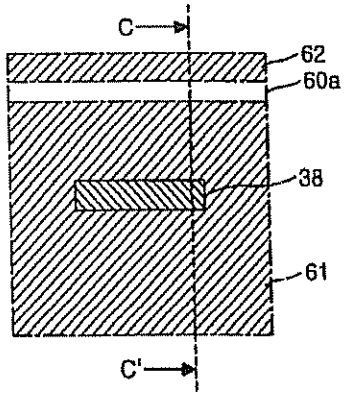
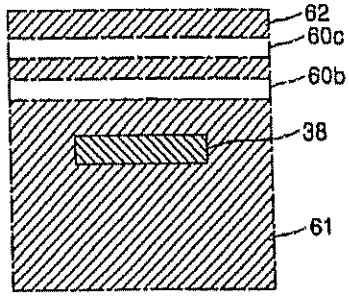


FIG. 13



UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	8733.246.00
First Inventor or Application Identifier	Sai Chang YUN et al.
Title	TAPE CARRIER PACKAGE WITH DUMMY BENDING PART AND LIQUID CRYSTAL DISPLAY EMPLOYING THE SAME

APPLICATION ELEMENTS
See MPEP chapter 600 concerning utility patent application contents

ADDRESS TO: Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

1. ☒ Fee Transmittal Form (e.g. PTO/SB/17) (Submit an original and a duplicate for fee processing)
2. ☒ Specification — Total Pages: 16
3. ☒ Drawing(s) *(35 U.S.C. 113)* — Total Sheets: 7
4. ☒ Oath or Declaration — Total Pages: 3
   a. ☒ Newly executed (original or copy)
   b. ☐ Copy from a prior application *(37 C.F.R. §1.63(d))* *(for continuation/divisional with box 15 completed)*
      i. ☐ DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see *37 C.F.R. §1.63(d)(2) and 1.33(b).*
5. ☐ Incorporation By Reference *(usable if box 4B is checked)* The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4B, is considered to be part of the disclosure of the accompanying application and is hereby incorporated by reference therein

ACCOMPANYING APPLICATION PARTS

6. ☒ Assignment Papers (cover sheet & document(s))
7. ☐ 37 C.F.R. §3.73(b) Statement *(when there is an assignee)* ☐ Power of Attorney
8. ☐ English Translation Document *(if applicable)*
9. ☐ Information Disclosure Statement (IDS)/PTO-1449 ☐ Copies of IDS Citations
10. ☐ Preliminary Amendment
11. ☒ White Advance Serial No. Postcard
12. ☐ Small Entity Statement(s) ☐ Statement filed in prior application, Status still proper and desired
13. ☒ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
14. ☒ Other: Request for Priority
    Check for $750.00 (filing fee, Recordation Assignment fee)

15. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below:*
☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application no.:
Prior application information: Examiner: Group Art Unit:

16. Amend the specification by inserting before the first line the sentence:
☐ This application is a ☐ Continuation ☐ Division ☐ Continuation-in-part (CIP)
of application Serial No Filed on
☐ This application claims priority of provisional application Serial No. Filed

17. **CORRESPONDENCE ADDRESS**

LONG ALDRIDGE & NORMAN LLP
701 Pennsylvania Avenue, N.W., Suite 600
Washington, D.C. 20004
(202) 624-1200
FACSIMILE: (202) 624-1298

Name:	Kenneth D. Springer	Registration No.:	39,843
Signature:		Date:	March 23, 2001
Name:		Registration No.:	

Docket No. 8733.246.00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR(S) Sai Chang YUN et al.

SERIAL NO: To Be Assigned

FILING DATE: March 23, 2001

FOR: TAPE CARRIER PACKAGE WITH DUMMY BENDING PART AND LIQUID CRYSTAL DISPLAY EMPLOYING THE SAME

FEE TRANSMITTAL

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

FOR	NUMBER FILED	NUMBER EXTRA	RATE	CALCULATIONS
TOTAL CLAIMS	15 - 20 =	0	x $18 =	$0.00
INDEPENDENT CLAIMS	3 - 3 =	0	x $80 =	$0.00
☐ MULTIPLE DEPENDENT CLAIMS (If applicable)			+ $270 =	$0.00
☐ LATE FILING OF DECLARATION			+ $130 =	$0.00
			BASIC FEE	$710.00
			TOTAL OF ABOVE CALCULATIONS	$710.00
☐ REDUCTION BY 50% FOR FILING BY SMALL ENTITY				$0.00
☐ FILING IN NON-ENGLISH LANGUAGE			+ $130 =	$0.00
☒ RECORDATION OF ASSIGNMENT			+ $40 =	$40.00
			TOTAL	$750.00

☐ Please charge Deposit Account No. 50-0911 in the amount of A duplicate copy of this sheet is enclosed.

☒ Checks totalling $750.00 to cover the filing and surcharge fees are enclosed

☒ The Commissioner is hereby authorized to charge any additional fees which may be required for the papers being filed herewith and for which no check is enclosed herewith, or credit any overpayment to Deposit Account No. 50-0911. A duplicate copy of this sheet is enclosed.

Respectfully Submitted,

LONG ALDRIDGE & NORMAN LLP

Date: March 23, 2001

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Tel. (202) 624-1200
Fax. (202) 624-1298
73951.1

Docket No. 8733.246.00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Sai Chang YUN et al. GAU: TBA

SERIAL NO: TBA EXAMINER: TBA

FILED: March 23, 2001

FOR: TAPE CARRIER PACKAGE WITH DUMMY BENDING PART AND LIQUID CRYSTAL DISPLAY EMPLOYING THE SAME

2/Print Papers G-Study 5-16-01

REQUEST FOR PRIORITY

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

☐ Full benefit of the filing date of U.S. Application Serial Number [US App No], filed [US App Dt], is claimed pursuant to the provisions of 35 U.S.C. §120.

☐ Full benefit of the filing date of U.S. Provisional Application Serial Number , filed , is claimed pursuant to the provisions of 35 U.S.C. §119(e).

☒ Applicants claim any right to priority from any earlier filed applications to which they may be entitled pursuant to the provisions of 35 U.S.C. §119, as noted below.

In the matter of the above-identified application for patent, notice is hereby given that the applicants claim as priority:

COUNTRY	APPLICATION NUMBER	MONTH/DAY/YEAR
KOREA	P2000-17026	March 31, 2000

Certified copies of the corresponding Convention Application(s)

☒ are submitted herewith

☐ will be submitted prior to payment of the Final Fee

☐ were filed in prior application Serial No. filed

☐ were submitted to the International Bureau in PCT Application Number
Receipt of the certified copies by the International Bureau in a timely manner under PCT Rule 17.1(a) has been acknowledged as evidenced by the attached PCT/IB/304.

☐ (A) Application Serial No.(s) were filed in prior application Serial No filed ; and

(B) Application Serial No.(s)

☐ are submitted herewith

☐ will be submitted prior to payment of the Final Fee

Respectfully Submitted,

Date: March 23, 2001

LONG ALDRIDGE & NORMAN LLP

Kenneth D. Springer
Registration No. 39,843

Sixth Floor
701 Pennsylvania Avenue, N.W.
Washington, D.C. 20004
Tel (202) 624-1200
Fax (202) 624-1298
73941.1

대 한 민 국 특 허 청
KOREAN INTELLECTUAL PROPERTY OFFICE

별첨 사본은 아래 출원의 원본과 동일함을 증명함.

This is to certify that the following application annexed hereto is a true copy from the records of the Korean Intellectual Property Office.

출 원 번 호 : 특허출원 2000년 제 17026 호
Application Number

출 원 년 월 일 : 2000년 03월 31일
Date of Application

출 원 인 : 엘지.필립스 엘시디 주식회사
Applicant(s)

2001 년 03 월 14 일

특 허 청
COMMISSIONER

1020000017026 2001/3/1

【서류명】	특허출원서
【권리구분】	특허
【수신처】	특허청장
【참조번호】	0003
【제출일자】	2000.03.31
【발명의 명칭】	더미 밴딩부를 가지는 테이프 캐리어 패키지와 이를 이용한 액정표시장치
【발명의 영문명칭】	Tape Carrier Package with Dummy Bending Part and Liqui Crystal Display Apparatus
【출원인】	
【명칭】	엘지 .필립스 엘시디 주식회사
【출원인코드】	1-1998-101865-5
【대리인】	
【성명】	김영호
【대리인코드】	9-1998-000083-1
【포괄위임등록번호】	1999-001050-4
【발명자】	
【성명의 국문표기】	윤세창
【성명의 영문표기】	YUN,Sai Chang
【주민등록번호】	610418-1798517
【우편번호】	730-040
【주소】	경상북도 구미시 형곡동 168-6번지 이구로얄 2차 1003호
【국적】	KR
【발명자】	
【성명의 국문표기】	안은영
【성명의 영문표기】	AN,Eun Yeong
【주민등록번호】	750922-2683921
【우편번호】	730-360
【주소】	경상북도 구미시 진평동 642-3 엘지 필립스 엘시디 회로설계팀
【국적】	KR
【심사청구】	청구
【취지】	특허법 제42조의 규정에 의한 출원, 특허법 제60조의 규정에 의한 출원심사 를 청구합니다 대리인 김영호 (인)

1020000017026

2001/3/1

【수수료】

【기본출원료】	20	면	29,000 원
【가산출원료】	1	면	1,000 원
【우선권주장료】	0	건	0 원
【심사청구료】	5	항	269,000 원
【합계】	299,000 원		

1020000017026 2001/3/1

【요약서】

【요약】

본 발명은 화면의 휘도차를 줄이도록 한 더미 밴딩부를 가지는 테이프 캐리어 패키지에 관한 것이다.

본 발명에 따른 더미 밴딩부를 가지는 테이프 캐리어 패키지는 액정패널에 접속되는 패드부와; 액정패널에 신호를 인가하기 위한 집적회로칩이 실장되는 베이스필름과; 패드부와 집적회로칩 사이의 베이스 필름이 제거됨으로써 패드부의 열팽창에 따라 상기 액정패널에 가해지는 응력을 분산시키기 위한 더미 밴딩부를 구비한다.

【대표도】

도 9

1020000017026 2001/3/1

【명세서】

【발명의 명칭】

더미 벤딩부를 가지는 테이프 캐리어 패키지와 이를 이용한 액정표시장치(Tape Carrier Package with Dummy Bending Part and Liquid Crystal Display Apparatus)

【도면의 간단한 설명】

도 1a는 종래의 벤딩타입의 테이프 오토메이티드 본딩 방식을 나타내는 단면도.

도 1b는 종래의 플랫타입의 테이프 오토메이티드 본딩 방식을 나타내는 단면도.

도 2는 도 1a에 도시된 테이프 캐리어 패키지를 나타내는 평면도.

도 3은 도 2에서 선 'A-A' '을 따라 절취하여 나타내는 테이프 캐리어 패키지의 단면도.

도 4는 휘도측정을 위해 시료로 이용되는 테이프 캐리어 패키지가 부착된 액정패널을 나타내는 평면도.

도 5는 테이프 캐리어 패키지로 인한 하부 유리기판의 변형을 도식적으로 나타내는 단면도.

도 6은 그레이패턴에 대한 도 4에 도시된 액정패널에서 검출되는 휘도레벨을 나타내는 특성도.

도 7은 그레이패턴에 대한 도 4에 도시된 액정패널에서 검출되는 휘도레벨을 나타내는 특성도.

도 8은 본 발명의 제1 실시예에 따른 테이프 캐리어 패키지를 나타내는 평면도.

도 9는 도 8에서 선 'B-B' '을 따라 절취하여 나타내는 테이프 캐리어 패키지의 단면도.

도 10은 본 발명의 제2 실시예에 따른 테이프 캐리어 패키지를 나타내는 평면도.

도 11은 도 10에서 선 'C-C' '을 따라 절취하여 나타내는 테이프 캐리어 패키지의 단면도.

도 12는 본 발명의 제3 실시예에 따른 테이프 캐리어 패키지를 나타내는 평면도.

도 13은 본 발명의 제4 실시예에 따른 테이프 캐리어 패키지를 나타내는 평면도.

< 도면의 주요 부분에 대한 부호의 설명 >

2 : 액정패널	3 : 유리기판
4 : 백라이트 유닛	6 : 인쇄회로보드
8,38 : 드라이브 집적회로	10,10a~10h,12 : 테이프 캐리어 패키지
10a,10b,30a,30b,50a,50b : 밴딩부	21,41,51,61 : 입력패드부
22,42,52,62 : 출력 패드부	24,44,54 : 베이스필름
25,45.55 : 접착제	26,46.56 : 리드부
27,47 57 : 솔더 레지스터	30c,50c,50d,60a,60b,60c : 더미 밴딩부

【발명의 상세한 설명】

【발명의 목적】

【발명이 속하는 기술분야 및 그 분야의 종래기술】

<23> 본 발명은 액정표시장치 상에 집적회로를 실장하는 장치에 관한 것으로, 특히 화면의 휘도차를 줄이도록 한 더미 밴딩부를 가지는 테이프 캐리어 패키지에 관한 것이다. 또한, 본 발명은 상기 테이프 캐리어 패키지를 이용하여 휘도차를 줄이도록 한 액정표시장치에 관한 것이다.

<24> 액티브 매트릭스(Active Matrix) 구동방식의 액정표시장치는 스위칭 소자로서 박막 트랜지스터(Thin Film Transistor : 이하 'TFT'라 함)를 이용하여 자연스러운 동화상을 표시하고 있다. 이러한 액정표시장치는 브라운관에 비하여 소형화가 가능하여 휴대용 텔레비젼(Television)이나 랩탑(Lap-Top)형 퍼스널 컴퓨터(Personal Computer) 등의 모니터로서 상품화되고 있다.

<25> 액티브 매트릭스 타입의 액정표시장치는 화소들이 게이트라인들과 데이터라인들의 교차부들 각각에 배열되어진 화소매트릭스(Picture Element Matrix 또는 Pixel Matrix)에 텔레비전 신호와 같은 비디오신호에 해당하는 화상을 표시하게 된다. 화소들 각각은 데이터라인으로부터의 데이터신호의 전압레벨에 따라 투과 광량을 조절하는 액정셀을 포함한다. TFT는 게이트라인과 데이터라인들의 교차부에 설치되어 게이트라인으로부터의 스캔신호(게이트펄스)에 응답하여 액정셀쪽으로 전송될 데이터신호를 절환하게 된다.

<26> 이와 같은 액정표시장치는 데이터라인들과 게이트라인들에 접속되어 각각 데이터신호와 스캔신호를 데이터라인들과 게이트라인들에 공급하기 위한 다수의 구동

집적회로들(Driving Integrated Circuit : 이하 'D-IC'라 함)이 필요하게 된다. D-IC들은 인쇄회로보드(Prined Circuit Board : 이하 'PCB'라 함)와 액정패널 사이에 설치되어 PCB로부터 공급되는 제어신호에 응답하여 액정패널의 데이터라인들과 게이트라인들에 데이터신호와 스캔신호를 공급하게 된다. D-IC들의 실장방법으로는 패널의 유효면적을 넓힐 수 있고 비교적 실장공정이 단순한 테이프 오토메이티드 본딩(Tape Automated Bonding : 이하 'TAB'라 함) 방식이 가장 일반적으로 이용되고 있다.

<27> TAB 방식은 도 1a와 같은 벤딩타입(Bending type)과 도 1b와 같은 플랫타입(Flat type)으로 나뉘어진다.

<28> 도 1a와 같은 벤딩타입의 TAB 방식은 모니터나 노트북 컴퓨터의 소오스 드라이버와 게이트 드라이버의 실장방법으로 이용되고 있다. 이 벤딩타입의 TAB 방식은 D-IC(8)가 실장되고 액정패널(2)의 하부 유리기판(3)과 PCB(6) 사이에 접속된 테이프 캐리어 패키지(Tape Carrier Package : 이하 'TCP'라 함)(10)를 구부림으로써 PCB(6)를 액정패널(2)의 배면 쪽에 접철시키게 된다. TCP(10)의 베이스필름(24) 상에는 도 2 및 도 3에 나타낸 바와 같이, 접착제(25)가 도포되고 그 위에 리드부(26)가 접착된다. 동(Cu)으로 된 리드부(26)는 D-IC(8)의 핀들에 접속된다. 이 리드부(26)에는 절연 역할을 하는 솔더 레지스터(Solder Resister)(27)가 코팅된다. 베이스필름(24)의 상단과 하단에는 리드부(26)의 각 리드들로부터 신장되는 입력 패드부(21)와 출력 패드부(22)가 형성된다. 입력 패드부(21)는 PCB(6)의 출력신호배선과 접속되며, 출력측 패드부(22)는 하부 유리기판(3) 상에 형성된 게이트라인이나 데이터라인에 접속된다. 입력 패드부(21)와 D-IC(8) 사이와 출력 패드부(22)와 D-IC(8) 사이에는 벤딩부(10a,10b)가 형성된다. 벤딩부

(10a,10b)에는 베이스필름(24)이 제거된다. 이 밴딩부(10a,10b)에 의해 TCP(10)는 쉽게 구부러지게 된다.

<29> 도 1b와 같은 플랫타입의 TAB 방식은 10.4" 또는 12.1" 소형 노트북 컴퓨터 또는 모니터의 게이트 드라이버 실장방법으로 주로 이용되고 있다. 이 플랫타입의 TAB 방식은 D-IC(8)가 실장되고 액정패널(2)의 하부 유리기판(3)과 PCB(6) 사이에 접속된 TCP(8)가 액정패널(2)과 나란하게 배치된다. 따라서, 플랫타입으로 액정패널(2)과 PCB(6) 사이에 접속된 TCP(12)에는 구부러지지 않기 때문에 밴딩부가 형성되지 않는다.

<30> 그러나 종래의 TAB 방식은 액정패널(2) 상에 TCP(10,12)가 접착되는 영역과 접착되지 않는 영역 사이에 휘도차를 일으키는 문제점이 있다. 이를 상세히 하면, TCP들(10a 내지 10h)은 도 4와 같이 소정 간격을 두고 도시하지 않은 이방성 도전필름(Anisotopci Conductive Film : 이하 'ACF'라 함)을 사이에 두고 고온, 고압 환경하에서 하부 유리기판(3)의 가장자리에 접착된다. 이 때, TCP들(10a 내지 10h)은 열에 의해 팽창되고 접착 후에 자신에게 가해지는 열이 상온으로 낮아지면서 수축된

다. 이러한 TCP들(10a 내지 10h)에 의해 하부 유리기판(3)에는 응력(Stress)이 가해지게 된다. 그 결과, 하부 유리기판(3)이 도 5와 같이 주기적인 산/골 형태로 변형되므로 도시하지 않은 상부 유리기판과 하부 유리기판(3) 사이의 셀갭(Cell gap)은 주기적으로 두께차이가 나타나게 된다. 해상도가 SVGA(800×600)이고 휘도가 300 nit인 도 4와 같은 12.1" 액정패널 중 두 개의 샘플을 대상으로 그레이패턴(Gray pattern) '7'과 '3'에서 각각 실험한 결과, 주기적으로 휘도차가 나타난다. 실험결과에 의하면, 셀갭차가 나타나는 TCP들(10a 내지 10h)의 접착영역(a,c,e,g,i,k)과 비접착영역(b,d,f,h,i)의 휘도차는 다음의 표 1과 도 6 및 도 7과 같다. 휘도 측정 장비로는 수광되는 광량에 따라 휘도레벨을 감지하는 광학적 측정장치인 'PR880'이 사용되었다.

<31> 【표 1】

측정 포인트		a	b	c	d	e	f	g	h	i	j	k
샘플 1	7 Gray	0.577	0.74	0.679	0.879	0.818	0.956	0.801	0.959	0.829	0.957	0.794
	3 Gray	0.44	0.538	0.491	0.642	0.577	0.703	0.584	0.707	0.604	0.712	0.596
샘플 2	7 Gray	1.628	2.075	1.892	2.293	1.974	2.165	2.165	2.563	2.217	2.587	2.132
	3 Gray	1.925	1.233	1.089	1.369	1.129	1.464	1.258	1.564	1.291	1.549	1.245

<32> 표 1에서 알 수 있는 바, TCP들(10a 내지 10h)의 접착영역(a,c,e,g,i,k)과 비접착영역(b,d,f,h,i)에서 휘도차가 나타나게 된다. 두 개의 샘플들에서 7 그레이패턴과 3 그레이패턴의 평균 휘도차는 각각 0.2691과 0.1957이다. TCP들(10a 내지 10h)의 길이가 길어지거나 두꺼워질수록 TCP들(10a 내지 10h)에 의해 하부 유리기판(3)에 가해지는 응력이 그 만큼 커지므로 TCP들(10a 내지 10h)의 접착영역(a,c,e,g,i,k)과 비접착영역(b,d,f,h,i) 간의 휘도차가 더 커지게 된다. 이에 따라, 액정표시장치의 표시품질을 높이기 위해서는 TCP(10a 내지 10h)로 인한 휘도차를 줄일 수 있는 방안이 요구되고 있다.

【발명이 이루고자 하는 기술적 과제】

<33> 따라서, 본 발명의 목적은 화면의 휘도차를 줄이도록 한 더미 밴딩부를 가지는 TCP를 제공하는데 있다.

<34> 본 발명의 다른 목적은 화면의 휘도차를 줄이도록 한 액정표시장치를 제공하는데 있다

【발명의 구성 및 작용】

<35> 상기 목적들을 달성하기 위하여, 본 발명에 따른 더미 밴딩부를 가지는 TCP는 액정패널에 접속되는 패드부와; 액정패널에 신호를 인가하기 위한 집적회로칩이 실장되는 베이스필름과; 패드부와 집적회로칩 사이의 베이스 필름이 제거됨으로써 패드부의 열팽창에 따라 상기 액정패널에 가해지는 응력을 분산시키기 위한 더미 밴딩부를 구비한다.

<36> 본 발명에 따른 더미 밴딩부를 가지는 TCP는 액정패널에 신호를 인가하기 위한 집적회로칩이 실장되는 베이스필름과; 집적회로로부터 연장되어 액정패널에 접속되기 위한 패드부와; 테이프 캐리어 패키지가 꺾여지는 부분의 베이스필름을 제거한 적어도 하나 이상의 밴딩부와; 집적회로의 장축방향에 평행한 베이스필름의 열팽창력 및 열수축력을 줄이도록 테이프 캐리어 패키지가 꺾여지지 않는 부분에서 소정 베이스 필름을 제거한 적어도 하나 이상의 더미 밴딩부를 구비한다.

<37> 본 발명에 따른 액정표시장치는 액정패널과; 액정패널에 접속되는 테이프 캐리어 패키지가, 액정패널에 신호를 인가하기 위한 집적회로칩이 실장되는 베이스필름과; 집적

회로로부터 연장되어 상기 액정패널에 접속되기 위한 패드부와; 테이프 캐리어 패키지가 꺾여지는 부분의 베이스필름을 제거한 적어도 하나 이상의 밴딩부와; 패드부와 액정패널의 열압착시 발생되는 열팽창력 및 열수축력을 줄이도록 상기 패드부 상에 상기 패드 단자의 장착에 수직방향으로 베이스필름을 제거한 더미 밴딩부를 구비하고, 테이프 캐리어 패키지의 입력패드부와 접속되는 인쇄회로보드를 구비한다.

<38> 상기 목적들 외에 본 발명의 다른 목적 및 특징들은 첨부한 도면들을 참조한 실시예에 대한 설명을 통하여 명백하게 드러나게 될 것이다.

<39> 이하, 도 8 내지 도 13을 참조하여 본 발명의 바람직한 실시예에 대하여 설명하기로 한다.

<40> 도 8 및 도 9는 본 발명의 제1 실시예에 따른 TCP를 나타내는 것으로서 밴딩타입의 TAB 방식에 적용된다.

<41> 도 8 및 도 9를 참조하면, 본 발명에 따른 TCP는 베이스필름(44) 상에 실장된 D-IC(38)와, 입력 패드부(41)와 D-IC(38) 사이에 형성되는 제1 밴딩부(30a)와, 출력 패드부(42)와 D-IC(38) 사이에 나란히 형성되는 제2 밴딩부(30b) 및 더미 밴딩부(30c)를 구비한다. D-IC(38)는 액정패널(2)의 게이트라인이나 데이터라인에 스캔신호나 데이터를 공급하는 역할을 한다. 이 D-IC(38)의 출력핀들은 접착제(45)에 의해 베이스필름(44) 상에 접착되는 리드부(46)에 접속된다. 리드부(46)에는 절연 역할을 하는 솔더 레지스터(47)가 코팅된다. 입력 패드부(41)에는 리드부(46)로부터 신장되어 PCB(6)의 출력신호배선에 접속되는 패드들이 형성된다. 이 입력 패드부(41)와 D-IC(38) 사이에는 베이스필름(44)이 제거되는 제1 밴딩부(30a)가 형성된다. PCB(6)와 D-IC(38) 사이의 TCP는 제1 밴딩부(30a)에 의해 쉽게 구부러지게 된다. 출력 패드부(42)에는 각각 리드

부(46)로부터 신장되어 하부 유리기판(3)의 가장자리에 형성된 패드돌과 접속되는 패드들이 형성된다. 이 출력 패드부(42)와 D-IC(38) 사이에는 각각 베이스필름(44)이 제거되는 제2 밴딩부(30b)와 더미 밴딩부(30c)가 형성된다. 액정패널(2)과 D-IC(38) 사이의 TCP는 제2 밴딩부(30b)에 의해 쉽게 구부러지게 된다. 더미 밴딩부(30c)는 TCP와 하부 유리기판(3)의 접착시에 열이 가해지는 TCP 영역을 줄이게 된다. 이에 따라, TCP의 영 팽창양이 줄어들게 되므로 TCP에 의해 하부 유리기판(3)에 가해지는 응력이 분산되어 작아지게 된다.

<42> 도 10 및 도 11은 본 발명의 제2 실시예에 따른 TCP를 나타내는 것으로서 밴딩타입의 TAB 방식에 적용된다.

<43> 도 10 및 도 11을 참조하면, 본 발명에 따른 TCP는 베이스필름(44) 상에 실장된 D-IC(38)와, 입력 패드부(51)와 D-IC(38) 사이에 형성되는 제1 밴딩부(50a)와, 출력 패드부(52)와 D-IC(38) 사이에 나란히 형성되는 제2 밴딩부(50b), 제1 더미 밴딩부(50c) 및 제2 더미 밴딩부(50d)를 구비한다. 입력 패드부(51)에는 리드부(56)로부터 신장되어 PCB(6)의 출력신호배선에 접속되는 패드돌이 형성된다. 이 입력

패드부(51)와 D-IC(58) 사이에는 베이스필름(44)이 제거되는 제1 밴딩부(30a)가 형성된다. PCB(6)와 D-IC(38) 사이의 TCP는 제1 밴딩부(50a)에 의해 쉽게 구부러지게 된다. 출력 패드부(52)에는 각각 리드부(46)로부터 신장되어 하부 유리기판(3)의 가장자리에 형성된 패드들과 접속되는 패드들이 형성된다. 이 출력 패드부(52)와 D-IC(38) 사이에는 각각 베이스필름(54)이 제거되는 제2 밴딩부(50b), 제1 더미 밴딩부(50c) 및 제2 더미 밴딩부(50d)가 형성된다. 액정패널(2)과 D-IC(38) 사이의 TCP는 제2 밴딩부(50b)에 의해 쉽게 구부러지게 된다. 제1 및 제2 더미 밴딩부(50c,50d)는 TCP에 의해 하부 유리기판(3)에 가해지는 응력을 분산시키고 작게 하는 역할을 한다. TCP와 하부 유리기판(3)의 접착시에 열이 가해지는 TCP 영역은 도 8의 그것에 비하여 제2 밴딩부(50d)에 의해 더 줄어들게 된다.

<44> 도 12 및 도 13은 본 발명의 다른 실시예들에 따른 TCP를 나타내는 것으로서 플랫타입의 TAB 방식에 적용된다.

<45> 도 12 및 도 13을 참조하면, 본 발명에 따른 TCP는 베이스필름(44) 상에 실장된 D-IC(38)와, 출력 패드부(62)와 D-IC(38) 사이에 적어도 하나 이상 형성되는 더미 밴딩부(60a,60b,60c)를 구비한다. 입력 패드부(61)에는 리드부(56)로부터 신장되어 PCB(6)의 출력신호배선에 접속되는 패드들이 형성된다. 출력 패드부(62)에는 리드부(56)로부터 신장되어 하부 유리기판(3)의 가장자리에 형성된 패드들과 접속되는 패드들이 형성된다. 이 출력 패드부(62)와 D-IC(38) 사이에는 베이스필름(54)이 제거되는 하나 또는 둘의 더미 밴딩부(60a,60b,60c)가 형성된다. 더미 밴딩부들(60a,60b,60c)는 TCP에 의해 하부 유리기판(3)에 가해지는 응력을 분산시키고 작게 하는 역할을 한다.

【발명의 효과】

<46> 상술한 바와 같이, 본 발명에 따른 더미 밴딩부를 가지는 TCP는 액정패널의 유리기판에 접착되는 출력패드에 근접한 베이스 필름을 제거함으로써 TCP에 의해 유리기판에 가해지는 응력을 분산시키고 작게 한다. 그 결과, 본 발명에 따른 더미 밴딩부를 가지는 TCP는 화면의 휘도차를 줄일 수 있게 된다. 본 발명에 따른 액정표시장치는 상기 더미 밴딩부를 가지는 TCP가 접착되므로 그 만큼 유리기판에 가해지는 응력을 줄이고 TCP의 접착영역과 TCP의 비접착영역 간의 셀갭차를 줄일 수 있다. 이에 따라, 본 발명에 따른 액정표시장치는 TCP의 접착영역과 TCP의 비접착영역에서 셀갭이 일정하게 유지되므로 화면의 휘도차를 줄일 수 있게 된다.

<47> 이상 설명한 내용을 통해 당업자라면 본 발명의 기술사상을 일탈하지 아니하는 범위에서 다양한 변경 및 수정이 가능함을 알 수 있을 것이다. 따라서, 본 발명의 기술적 범위는 명세서의 상세한 설명에 기재된 내용으로 한정되는 것이 아니라 특허 청구의 범위에 의해 정하여 져야만 할 것이다.

【특허청구범위】

【청구항 1】

액정패널에 접속되는 패드부와;

상기 액정패널에 신호를 인가하기 위한 집적회로칩이 실장되는 베이스필름과;

상기 패드부와 상기 집적회로칩 사이의 상기 베이스 필름이 제거됨으로써 상기 패드부의 열팽창에 따라 상기 액정패널에 가해지는 응력을 분산시키기 위한 더미 밴딩부를 구비하는 것을 특징으로 하는 더미 밴딩부를 가지는 테이프 캐리어 패키지.

【청구항 2】

제 1 항에 있어서,

상기 더미 밴딩부와 상기 집적회로칩 사이의 구부러지는 위치 상에 존재하는 상기 베이스 필름이 제거되는 제1 밴딩부를 추가로 구비하는 특징으로 하는 더미 밴딩부를 가지는 테이프 캐리어 패키지.

【청구항 3】

액정패널에 접속되는 테이프 캐리어 패키지에 있어서,

상기 액정패널에 신호를 인가하기 위한 집적회로칩이 실장되는 베이스필름과;

상기 집적회로로부터 연장되어 상기 액정패널에 접속되기 위한 패드부와;

상기 테이프 캐리어 패키지가 꺾여지는 부분의 베이스필름을 제거한 적어도 하나 이상의 밴딩부와;

상기 집적회로의 장축방향에 평행한 베이스필름의 열팽창력 및 열수축력을 줄이도

록 상기 테이프 캐리어 패키지가 꺾여지지 않는 부분에서 소정 베이스 필름을 제거한 적어도 하나 이상의 더미 밴딩부를 구비하는 것을 특징으로 하는 테이프 캐리어 패키지.

【청구항 4】

제 3 항에 있어서,

상기 더미 밴딩부가 상기 패드부 상에 위치하는 것을 특징으로 하는 더미 밴딩부를 가지는 테이프 캐리어 패키지.

【청구항 5】

액정표시장치에 있어서,

액정패널과 ;

상기 액정패널에 접속되는 테이프 캐리어 패키지가,

상기 액정패널에 신호를 인가하기 위한 집적회로칩이 실장되는 베이스필름과;

상기 집적회로로부터 연장되어 상기 액정패널에 접속되기 위한 패드부와;

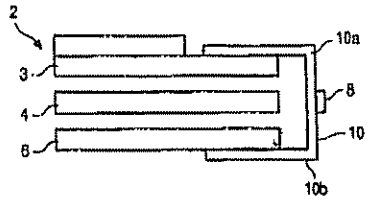
상기 테이프 캐리어 패키지가 꺾여지는 부분의 베이스필름을 제거한 적어도 하나 이상의 밴딩부와;

상기 패드부와 액정패널의 열압착시 발생되는 열팽창력 및 열수축력을 줄이도록 상기 패드부 상에 상기 패드단자의 장착에 수직방향으로 베이스필름을 제거한 더미 밴딩부를 구비하고,

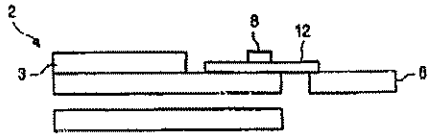
상기 테이프 캐리어 패키지의 입력패드부와 접속되는 인쇄회로보드를 구비하는 것을 특징으로 하는 액정표시장치.

【도면】

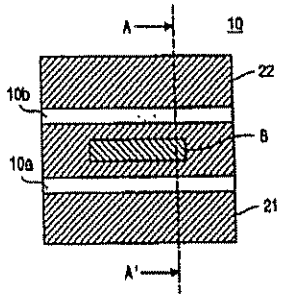
【도 1a】



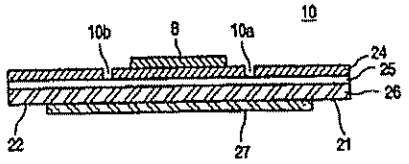
【도 1b】



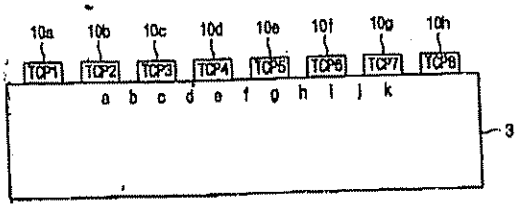
【도 2】



【도 3】



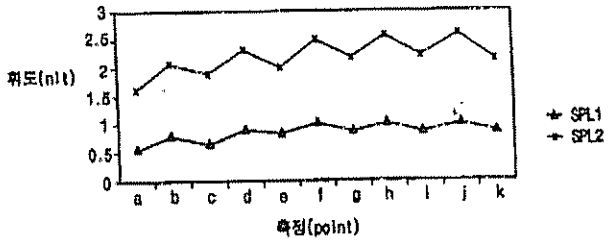
【도 4】


10a
10b
10c
10d
10e
10f
10g
10h
TCP1
TCP2
TCP3
TCP4
TCP5
TCP6
TCP7
TCP8
a b c d e f g h i j k
3

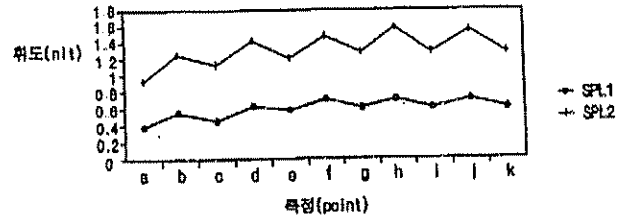
【도 5】


10
3

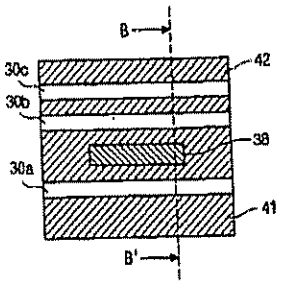
【도 6】


휘도(nit)
3
2.5
2
1.5
1
0.5
0
a b c d e f g h i j k
측정(point)
SPL1
SPL2

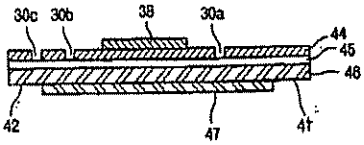
【도 7】


휘도(nit)
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
a b c d e f g h i j k
측정(point)
SPL1
SPL2

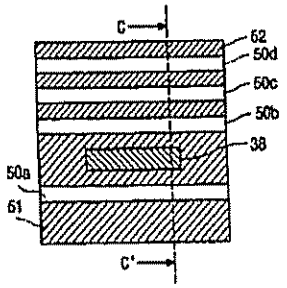
【도 8】


B
30c
42
30b
38
30a
41
B'

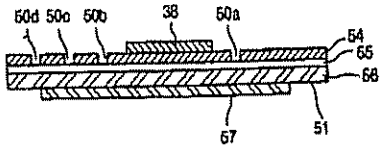
【도 9】


30c
30b
38
30a
44
45
46
42
47
41

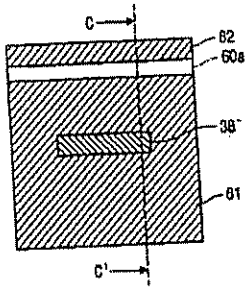
【도 10】


C
52
50d
50c
50b
38
50a
51
C'

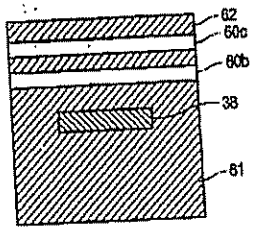
【도 11】


50d
50c
50b
38
50a
54
55
58
57
51

【도 12】



【도 13】



03.04.02

Docket No.: 8733.246.00-US
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Sai C. Yun, et al.

Application No.: 09/814,828

Filed: March 23, 2001

Group Art Unit: 2871

Examiner: Not Yet Assigned

For: TAPE CARRIER PACKAGE WITH DUMMY BENDING PART AND LIQUID CRYSTAL DISPLAY EMPLOYING THE SAME

INFORMATION DISCLOSURE STATEMENT (IDS)

Commissioner for Patents
Washington, DC 20231

Dear Sir:

Pursuant to 37 CFR 1.56, the attention of the Patent and Trademark Office is hereby directed to the references listed on the attached PTO/SB/08. It is respectfully requested that the information be expressly considered during the prosecution of this application, and that the references be made of record therein and appear among the "References Cited" on any patent to issue therefrom.

This Information Disclosure Statement is filed within three months of the U.S. filing date OR within three months of the date of entry of the national stage of a PCT application as set forth in 37 CFR 1.97(b) or before the mailing of a first Office Action on the merits, whichever event occurs last. No certification or fee is required.

A copy of each reference on PTO/SB/08 is attached.

A summary/abstract translation of the non-English language references is enclosed.